

**JOINT BOARD FOR THE ENROLLMENT OF ACTUARIES  
AMERICAN SOCIETY OF PENSION ACTUARIES  
SOCIETY OF ACTUARIES**

**EXAMINATION PROGRAM**

**MAY 2001 BASIC (EA-1) EXAMINATION  
MAY 2001 PENSION (EA-2, SEGMENT B) EXAMINATION  
NOVEMBER 2001 PENSION (EA-2, SEGMENT A) EXAMINATION**

**JANUARY 2001**

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## **INTRODUCTION**

The Joint Board for the Enrollment of Actuaries administers two actuarial examinations that must be successfully completed by individuals to satisfy the actuarial knowledge requirement for the designation of Enrolled Actuary. **Note that the structure of the examinations has changed as of January 1, 2001.**

The actuarial knowledge requirement for enrollment is augmented by a requirement that a candidate have certain responsible pension actuarial experience. Through a combined knowledge and experience requirement, the Joint Board seeks to determine which applicants for the designation of Enrolled Actuary have the skills necessary to protect the interests of pension plan participants.

The examinations are structured as follows:

The basic (EA-1) examination tests knowledge of (1) the mathematics of compound interest and practical financial analysis and (2) the mathematics of life contingencies and practical demographic analysis.

The pension (EA-2) examination, which consists of two segments, tests

- (a) in Segment A, the selection of actuarial assumptions, actuarial cost methods, and the calculation of minimum required and maximum deductible contributions, and
- (b) in Segment B, tests knowledge of relevant federal pension laws (in particular, the provisions of the Employee Retirement Income Security Act and related laws, regulations, and rulings) as they affect pension actuarial practice.

The EA-1 and the EA-2 Segment B examinations are given each May, the EA-2 Segment A examination is given each November.

A candidate for enrollment may be able to satisfy part of the actuarial knowledge requirement of the Joint Board regulations by earning a degree in actuarial mathematics or its equivalent from an accredited college or university. Such candidates will not have to pass the EA-1 examination. The courses in the plan of study and their successful completion must comply with guidelines adopted by the Joint Board for determining what demonstrates the requisite knowledge. The Joint Board will grant a waiver of the EA-1 examination to any candidate who received credit from the Society of Actuaries (SOA) for Courses 2 and 3 of the SOA's education and examination program.

Both the EA-1 and EA-2 actuarial examinations consist solely of multiple-choice questions. Each question will be assigned from one to five points. Point values for each question will be shown at the beginning of the question. The score on each examination is based on the questions answered correctly; no credit is given for omitted answers and no credit is deducted for wrong answers.

## **ALL EXAMINATIONS**

Most examination questions require arithmetical computations. Each candidate should bring an electronic calculator to the examination center for use in performing computations. Calculators should be able to compute financial functions such as amortization payments, present and future values, interest rates, time

periods, logarithmic functions, and exponential functions. Calculators are subject to the following conditions:

The examination supervisor will ascertain that all calculators: (a) have self-contained power sources, (b) are noiseless, and (c) do not have the capability to retain text. A candidate generally will be allowed to take the examination using a questionable calculator. However, any questions raised as to the appropriateness of a calculator will be noted on the supervisor's report along with the candidate's number and the make and model number of the calculator; a determination will be made later as to whether the calculator was permissible.

Candidates are solely responsible for the proper functioning and operation of their calculators during the examination. In addition, candidates must indicate on their examination answer sheets both the make and the model number of any calculator used.

The use of a calculator that does not meet the conditions above constitutes an irregularity and may be sufficient cause for disqualification from the examination.

In preparing the examinations, great care is taken so that each question has one and only one correct answer based on the data given. Each question is reviewed by all members of the Advisory Committee on Actuarial Examinations and by representatives of the sponsoring organizations. Nevertheless, because mistakes can occur, a request for consideration of an alternative answer to a given question, or for disregarding a question, will be entertained by the Joint Board but only under the following conditions:

An appeal must be made in writing and postmarked not later than six months after the examination was administered.

The appellant must describe in detail the fault found with the question and an alternative answer if one is claimed.

In the case of claimed ambiguity, credence will be given to an alternative interpretation only to the extent that such interpretation is one that might be reasonably made and is not strained in the light of attendant circumstances. This policy is of positive benefit to most candidates; otherwise, it would be necessary to burden each question with numerous qualifications and stipulations that the qualified practitioner does not require and which would make the question more difficult to read.

Not all topics listed in the syllabus of this examination program are necessarily covered on any particular year's examination, nor are the examination questions necessarily confined solely to the listed topics or suggested readings. Also, it is assumed that all candidates are familiar with the basic concepts and techniques of algebra and calculus.

Candidates are urged to develop a thorough understanding of the conditions generally or specifically applicable to all examination questions as set forth later in this examination program. Conditions for each examination will be included in the applicable examination booklets.

In addition, candidates should familiarize themselves with the list of limits, tables, and formulas applicable to the EA-2 (Segment B) examination, as set forth in this program. A copy of this list will also be included in the EA-2 (Segment B) examination booklet.

## TRANSITION CREDITS

Prior to January 1, 2001, the examinations were structured as follows:

The basic (EA-1) examination, which consisted of two segments, tested

- (a) in Segment A, knowledge of the mathematics of compound interest and the mathematics of life contingencies, and
- (b) in Segment B, knowledge of the basic mathematics used in pension actuarial work without regard to pension law.

The pension (EA-2) examination tested knowledge of relevant federal pension laws (in particular, the provisions of the Employee Retirement Income Security Act and related laws, regulations, and rulings) as they affect pension actuarial practice.

The sponsoring organizations will grant credit under the revised examination structure as of January 1, 2001 for prior examinations according to the following table:

Prior to January 1, 2001 Examinations Credited	Examinations Credited As of January 1, 2001	Examinations Remaining As of January 1, 2001
None	None	All
EA(1)-A	EA(1)	EA(2)-A, EA(2)-B
EA(1)-B	None	All
EA(2)	EA(2)-B	EA(1), EA(2)-A
EA(1)-A, EA(1)-B	EA(1)	EA(2)-A, EA(2)-B
EA(1)-A, EA(2)	EA(1), EA(2)-B	EA(2)-A
EA(1)-B, EA(2)	EA(2)-A, EA(2)-B	EA(1)
All	All	None

## **BASIC (EA-1) EXAMINATION**

**MAY 2001**

The EA-1 examination is two-and-one-half hours in length and covers (1) the mathematics of compound interest and practical financial analysis and (2) the mathematics of life contingencies and practical demographic analysis.

### **Syllabus**

#### **Mathematics of compound interest and financial analysis (approximately 25% - 50% of the examination)**

Nominal and effective rates of interest and discount, force of interest, accumulated value factors, and present value factors.

Annuities certain, increasing and decreasing annuities, annuities in which the payment frequency is not the same as the frequency at which interest is compounded, and perpetuities.

Amortization schedules and sinking funds, including the determination of outstanding principal, the split of payments into principal and interest, and the determination of required periodic payments.

Bonds and related securities, including bond price formulas, bond accounting, the split of periodic payments into amortization and interest, mortgages, and variable interest securities.

Determination of fund yield rates and effective rates of return using time-weighted and dollar weighted methods.

Duration and immunization of cash flows.

Asset reporting: realized and unrealized gains/losses, book value versus market value, and receivables.

Financial analysis, including inflation and its role, elements of risk and uncertainty, yield curves and available investments, and employee compensation increases.

#### **Mathematics of life contingencies and demographic analysis (approximately 50% - 75% of the examination)**

Measurements and demographic analysis of mortality, including the definition and application of standard mortality probability symbols and force of mortality.

Approximation of fractional period mortality and survival probability.

Measurement and demographic analysis of disability, employee turnover and employee retirement.

Adjustments to mortality, disability, turnover and retirement rate tables, such as age setbacks and set forwards, select and ultimate tables, projection scales and generation adjustments.

Life annuities, including life annuities with a term certain.

Population theory, including complete and curtate expectation of life, central death rates, stationary population, and average ages in a stationary population.

Multiple life functions, probabilities and annuities.

Multiple decrement functions, including associated single decrement tables, probabilities of decrement and the construction of multiple decrement tables from associated single decrement tables.

Principles of actuarial equivalence and related calculations.

One-year term costs for ancillary benefits.

Life insurance, including basic forms, single and annual premiums, varying insurance, and insurance and annuity relationships.

### **Suggested Readings**

The Advisory Committee on Actuarial Examinations believes that most (if not all) of the topics in the syllabus are covered in one or more of the following sources. The references listed below are to identify available resources from which the candidate may select. This list is not meant to describe or modify the syllabus listed above.

Batten, R.W., Life Contingencies – A Guide for the Actuarial Student (1998); (Second Edition) ACTEX Publications, P.O. Box 974, Winsted, CT 06098. **(This is *strictly* a supplement to *Actuarial Mathematics* and would be found to be of little value in the absence of a prior, detailed study of that text.)**

Bowers, N.L. et. al., Actuarial Mathematics, (Second Edition – 1997) (excluding Chapters 1, 2, 12, 13, 14, and 15); Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226. [(First edition (1986) may also be used (excluding chapters 1, 2, 11, 12, and 13)].

Brown, R.L., Introduction to Mathematics of Demography, (Third Edition – 1997), Chapters 3 and 5. ACTEX Publications, P.O. Box 974, Winsted, CT 06098.

Broverman, S.A., Mathematics of Investment and Credit (Second Edition – 1996); ACTEX Publications, P.O. Box 974, Winsted, CT 06098.

Jordan, C.W., Life Contingencies (Second Edition – 1967) **(NOTE: OUT OF PRINT)**

Kellison, S.G., The Theory of Interest (Second Edition – 1991); Irwin Professional Publishers. Available from McGraw-Hill, 6350 Crested Butte Circle, Colorado Springs, CO 80919.

London, D., Survival Models and Their Estimation, (Third Edition – 1997), Chapters 3-8. ACTEX Publications, P.O. Box 974, Winsted, CT 06098.

Parmenter, M.M., The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach (Third Edition – 1999); ACTEX Publications, P.O. Box 974, Winsted, CT 06098.

Zima, P. and Brown, R.L., Mathematics of Finance (1988); (Third Edition), McGraw-Hill Ryerson Limited, 300 Water Street, Whitby, ON, L1N 9B6

Actuarial Standard of Practice, No. 27, "Selection of Economic Assumptions for Measuring Pension Obligations"

Actuarial Standard of Practice, No. 35, "Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations"

In addition, the Society of Actuaries has developed various study notes for the use of students preparing for its examinations on these subjects. These study notes are revised periodically, and new study notes may be added. The following study notes are available as of December 31, 2000:

Measurement of Investment Return

Actuarially Equivalent Benefits

Commutation Functions

All candidates for the Joint Board EA-1 examination, even if not affiliated with the Society of Actuaries, should contact the Society of Actuaries to order copies of the study notes. It should be realized, however, that such material was not necessarily drawn up with the particular nature of the Joint Board examinations in mind.

**Conditions Generally Applicable to  
All EA-1 Examination Questions**

If applicable, the following conditions should be considered a part of the data for each question, unless otherwise stated or implied:

- (1) The normal retirement age is 65.
- (2) Retirement pensions commence at normal retirement age and are paid monthly for life at the beginning of each month.
- (3) There are no pre-retirement death or disability benefits.
- (4) Actuarial equivalence is based on the mortality table and interest rate assumed for funding purposes.
- (5) Interest rates that are compounded more frequently than annually are expressed as nominal rates.
- (6) Where multiple lives are involved, future lifetimes are assumed to be independent of each other.
- (7) The term “gross single premium” is equivalent to “contract single premium;” the term “net single premium” is equivalent to “single benefit premium;” the term “gross annual premium” is equivalent to “annual contract premium;” the term “net annual premium” is equivalent to “annual benefit premium.”
- (8) There are no policy loans in effect.
- (9) For a bond, the face amount and the redemption value are the same.
- (10) Interest rate equals yield rate.

## **PENSION EA-2 (SEGMENT B) EXAMINATION**

**MAY 2001**

The EA-2 Segment B examination is two-and-one-half hours in length and covers relevant pension laws (in particular the provisions of the Employee Retirement Income Security Act (ERISA) and related laws, regulations, and rulings) as they affect pension actuarial practice. The EA-2 Segment B examination presupposes knowledge of the topics covered in the EA-2 Segment A examination and in the EA-1 examination.

### **Syllabus**

Requirements with respect to reporting and disclosure, including underfunded plans, reductions in future benefit accruals, and reportable events

Nondiscrimination requirements including those related to plan participation, coverage, and permitted disparity

Requirements with respect to vesting, service credits, employee contributions, accrued benefits, normal retirement, early retirement, postponed retirement, joint and survivor annuities, and pre-retirement death benefits

Maximum benefit limitations

Additional requirements with respect to top-heavy plans

Requirements with respect to mergers and spin-offs, including those in the Internal Revenue Code and in Title IV of ERISA

PBGC premium requirements

Plan termination requirements including, standard and distress terminations, involuntary terminations, missing participants, guaranteed benefits, allocation of assets, plan liability and employer liability

Withdrawal liability under multiemployer plans

Excise taxes other than for funding requirements

Prohibited transactions and fiduciary standards

Standards of performance and professional conduct for enrolled actuaries

## **Suggested Readings**

New or revised sources, if any, are asterisked. Pension law and IRS promulgations can be found in publications of Warren, Gorham & Lamont, Commerce Clearing House, Maxwell Macmillan, Research Institute of America, and similar organizations. This list is not meant to describe or modify the syllabus listed above.

Employee Retirement Income Security Act of 1974 (ERISA), as amended through December 31, 2000.

Internal Revenue Code sections, all as amended through December 31, 2000:

- 318 Constructive Ownership of Stock
- 401 Qualified Plans – definition  
excluding subsections – (f),(g),(i),(m),(n),(o)
- 410 Minimum Participation Standards  
excluding subsections – (c),(d)
- 411 Minimum Vesting Standards  
excluding subsections – (e)
- 413 Collectively Bargained Plans, etc.
- 414 Definitions and Special Rules – controlled group, multiemployer, mergers, HCE, SLOB, compensation  
Excluding subsections – (d),(e),(o),(t),(u)
- 415 Limitations on Benefits & Contributions  
excluding subsections – (m),(n)
- 416 Top Heavy rules
- 417 Minimum Survivor Annuity Requirements
- 420 Transfers of Excess Pension Assets to Retiree Health Accounts
- 1563 Definitions and Special Rules – more controlled group
- 4974 Excise Tax on Certain Accumulations in Qualified Retirement Plans
- 4975 Tax on Prohibited Transactions
- 4980 Tax on Reversion of Qualified Plan Assets to Employer
- 6057 Annual Registration
- 6058 Information Required in Connection with Certain Plans of Deferred Compensation
- 6059 Periodic Report of Actuary

Joint Board regulations (20 CFR Part 901.20) governing the performance of actuarial services under ERISA.

Treasury Department Circular No. 230 (31 CFR Part 10) Section 10.3

IRS Promulgations:

Regulations

1.401(a)(4)	Nondiscrimination requirements
1.401(a)(17)	Limitation on annual compensation
1.401(a)(26)	Minimum participation requirements
1.401(I)	Permitted disparity
1.410(b)	Minimum coverage requirements
1.411(d)-4	Section 411(d)(6) protected benefits
1.414(I)	Mergers and consolidations of plans or transfers of plan assets
1.414(s)	Definition of Compensation
1.414(q)-1T	Highly compensated employees
1.415	General rules with respect to limitations on benefits and compensations under qualified plans
1.416-1	Questions and answers to top-heavy plans
1.417(e)-1	Restrictions and valuations of distributions from plans subject to sections 401(a)(11) and 417
301.6057-1	Employee retirement benefit plans; identification of participant with deferred vested retirement benefit
301.6057-2	Employee retirement benefit plans; notification of change in plan status
301.6058-1	Information required in connection with certain plans of deferred compensation
301.6059-1	Periodic report of actuary

Revenue Rulings

81-140	Suspension of Benefits due to reemployment.
81-195	Effect of 415 limits on minimum and maximum contribution levels, and inability to project future increases in limits for funding purposes.
81-215	Effect of 415 limits after valuation date but within plan year.
85-131	Reasonable allocation of past and future liabilities under unit credit method when 415 limit is involved.
86-48	Determining “Benefits on a Termination Basis” for the purpose of a spin-off. (i.e. early retirement benefits, optional forms, ...)
89-60	Interest rates used in determining employees’ “accumulated contributions.”
89-87	Terminated plans must distribute as soon as administratively feasible after plan termination.
92-66	Must an early retirement window benefit be provided permanently to all employees under a plan where the employer amends its plan to make the benefit available for substantially consecutive, limited periods of time?
95-6	Defines the applicable mortality table for calculating 415 limits under GATT.
98-1	Limitations on benefits and contributions, as amended by the Uruguay Round Agreement Act, and taking into account the applicable provisions of the Small Business Job Protection Act of 1996.

#### Notices

- 83-10 Questions and answers relating to the amendment of the limitations on benefits and contributions by the TEFRA of 1982.
- 87-20 Temporary Guidance On Interest Rate Used In Calculating Defined Benefit Plan Present Value And Benefits.
- 87-21 Guidance with respect to the effect of certain provisions TRA'86 dealing principally with the new limitations on contributions and benefits under Code section 415.
- 88-25 No year of service (including years of service before the effective date of the OBRA 1986 provisions) may be disregarded because of the attainment of any age in determining benefits payable to employees from certain employee benefit plans.
- 88-126 Regulation On Continued Benefit Accruals Will Depart From EEOCs; Pre-1988 Service May Not Be Ignored Because Of Age.
- 89-45 Guidance on benefit structure changes: where there are multiple changes to the benefit structure applicable to a participant.
- 97-75 Guidance relating to the amendments to the minimum distribution requirements of section 401(a)(9) of the Code made by section 1404 of the Small Business Job Protection Act of 1996, Pub. L. 104-188.
- 99-44 Section 415 Limitation on benefits and contributions under qualified plans.

#### PBGC Promulgations:

##### Regulations:

- 4001 General and Definitions
- 4006 Computing Premiums
- 4007 Paying Premiums
- 4010 Notification to PBGC
- 4011 Participant Notices
- 4022 Guaranteed Benefits
- 4041 Terminations
- 4043 Reportable Events
- 4044 Allocation of Assets
- 4050 Missing Participants
- 4062 Termination Liability for Sponsor
- 4211 Multiemployer Plan Withdrawal Liability
- 4219 Multiemployer Plan Withdrawal Liability

##### PBGC Technical Updates:

- \*00-4 2000 PBGC's Full Funding Limit Exemption from the Variable Rate Premium
- \*00-7 Increased Guarantee Limit for Multiemployer Plans

In addition, the Society of Actuaries has developed various study notes for the use of students preparing for its examinations on these subjects. These study notes are revised periodically, and new study notes may be added. The following study notes are available as of December 31, 2000:

A Practical Approach to Section 415 Limits

IRC Sections 401, 410, 411, 413, 414, 415, 416, 417 (there is a separate study note for each IRC Section)

Multiemployer Pension Plans Amendment Act of 1980

Pension Plan Terminations

Update for the Pension Plan Terminations Study Note

Commutation Functions

Reportable Events and Form 200 Requirements

Circular No. 230 (Section 10.3)

Tax Forms and PBGC Contacts

All candidates for the Joint Board EA-2 Segment B examination, even if not affiliated with the Society of Actuaries, should contact the Society of Actuaries to order copies of the study notes. It should be realized, however, that such material was not necessarily drawn up with the particular nature of the Joint Board examinations in mind.

### **Conditions Generally Applicable to All EA-2 Segment B Examination Questions**

If applicable, the following conditions should be considered a part of the data for each question, unless otherwise stated or implied:

#### **General Conditions Regarding Plan Provisions**

- (1) “Plan” or “pension plan” means a defined benefit pension plan.
- (2) The plan is qualified under Code section 401. Thus, for example, any benefit formulas should be understood to be limited by other plan provisions required by the Code.
- (3) The plan is sponsored by a single employer; the sponsoring employer is a taxable entity and is not a member of a controlled group.
- (4) The plan is not established or maintained in connection with a collectively bargained agreement.
- (5) The plan year, the employer's limitation year, and the employer's tax year are all the calendar year.
- (6) The normal retirement age is 65.
- (7) Retirement pensions commence at normal retirement age and are paid monthly for life at the beginning of each month.
- (8) The plan covers all active employees of the employer; there is no age or service requirement for participation. Thus, when referring to active employees, the terms “employee” and “participant” are synonymous.
- (9) There are no, and never have been, mandatory or voluntary employee contributions.
- (10) Service for purposes of vesting and benefit accrual is credited on the basis of time elapsed since date of hire.
- (11) When the normal retirement benefit is computed as a dollar amount, or as a percentage of compensation, for each year of service, the accrued benefit is defined likewise.
- (12) Actuarial equivalence is based on the mortality table and interest rate assumed for funding purposes.
- (13) Qualified joint and survivor annuities and qualified preretirement survivor annuities are provided in such manner that they result in no cost to the employer.
- (14) The plan has not been top-heavy in any year.
- (15) The plan has not been amended since its effective date.

### **General Conditions Regarding Funding**

- (16) Any actuarial valuation encompasses not only all active employees but also retired employees, beneficiaries, and former employees entitled to vested deferred pensions.
- (17) The valuation date is the first day of the plan year; i.e., participant data, present values, asset values, etc. are as of that date. Also, normal costs are payable annually, the first being due on the valuation date.
- (18) The terms “actuarial value of assets” and “market value of assets” mean the values developed for purposes of Code section 412, before being adjusted as required under funding methods of the aggregate type for items such as the existing credit balance or the outstanding balances of certain bases.
- (19) All actuarial assumptions are deemed “reasonable” and meet the “best estimate” criterion.
- (20) The adoption date of any plan or amendment is the same as its effective date.
- (21) The term “minimum required contribution” means the smallest contribution for a plan year which will prevent a funding deficiency at the end of that plan year, without regard to the alternative minimum funding standard account. Amounts to be amortized are not combined or offset against one another.
- (22) The employer is taxable, and all employer contributions for each prior plan year have been deducted by the employer for its tax year coincident with such plan year.
- (23) The full funding limitation has never applied.
- (24) The full funding limitations based on current liability shall be disregarded if sufficient information to determine such limitations is not provided.
- (25) For purposes of determining the deductible limit, the unfunded current liability shall be disregarded if sufficient information to determine such liability is not provided.
- (26) Unless separate current liabilities are provided, the current liability is the same for all purposes.

### **Miscellaneous General Condition**

- (27) All plan provisions and funding comply with all temporary and final regulations under the Internal Revenue Code and ERISA, as amended through December 31, 2000.
- (28) The employer has never maintained a defined contribution plan. No employee has been covered by a defined contribution plan that is required to be aggregated with his employer’s plans for purposes of Code section 415.
- (29) The terms “applicable mortality (table)” and “applicable interest (rate)” are as defined in Internal Revenue Code section 417(e)(3).
- (30) For purposes of coverage testing under Internal Revenue Code Section 410(b), “snapshot” testing is not used and permitted disparity is not imputed.

- (31) Transition rules under Revenue Ruling 98-1 shall be disregarded unless there is specific reference to such rules.
- (32) References to law and regulation section numbers are for clarity and can be assumed to be correct.

If applicable, the preceding conditions should be considered a part of the data for each question, unless otherwise stated or implied.

**LIMITS, TABLES AND FORMULAS**  
**(To be included with the EA-2 (Segment B) examination)**

<b>Compensation Limit IRC section 401(a)(17)</b>	
<u>Year</u>	<u>Limit</u>
1989	200,000
1990	209,200
1991	222,220
1992	228,860
1993	235,840
1994-1996	150,000
1997-1999	160,000
2000-2001	170,000

<b>Maximum Benefit Limit IRC section 415(b)</b>	
<u>Year</u>	<u>Limit</u>
1983-1987	90,000
1988	94,023
1989	98,064
1990	102,582
1991	108,963
1992	112,221
1993	115,641
1994	118,800
1995-1996	120,000
1997	125,000
1998-1999	130,000
2000	135,000
2001	140,000

<b>Highly Compensated Employee Compensation IRC section 414(q)</b>	
<u>Year</u>	<u>Limit</u>
1997-1999	80,000
2000-2001	85,000

<b>Nondiscriminatory Classification Test IRC section 410(b)</b>		
Nonhighly compensated employee		
<u>concentration</u>	Safe harbor	Unsafe harbor
<u>percentage</u>	<u>percentage</u>	<u>percentage</u>
0-60	50.00	40.00
61	49.25	39.25
62	48.50	38.50
63	47.75	37.75
64	47.00	37.00
65	46.25	36.25
66	45.50	35.50
67	44.75	34.75
68	44.00	34.00
69	43.25	33.25
70	42.50	32.50
71	41.75	31.75
72	41.00	31.00
73	40.25	30.25
74	39.50	29.50
75	38.75	28.75
76	38.00	28.00
77	37.25	27.25
78	36.50	26.50
79	35.75	25.75
80	35.00	25.00
81	34.25	24.25
82	33.50	23.50
83	32.75	22.75
84	32.00	22.00
85	31.25	21.25
86	30.50	20.50
87	29.75	20.00
88	29.00	20.00
89	28.25	20.00
90	27.50	20.00
91	26.75	20.00
92	26.00	20.00
93	25.25	20.00
94	24.50	20.00
95	23.75	20.00
96	23.00	20.00
97	22.25	20.00
98	21.50	20.00
99	20.75	20.00

**LIMITS, TABLES AND FORMULAS**  
**(To be included with the EA-2 (Segment B) examination)**

<b>Permitted Disparity Tables IRC section 401(l)</b>				
Annual factor in maximum excess allowance and maximum offset allowance percent				
Age at benefit <u>Commencement</u>	<u>SSRA 65</u>	<u>SSRA 66</u>	<u>SSRA 67</u>	Simplified <u>Table</u>
70	1.209	1.101	1.002	1.048
69	1.096	0.998	0.908	0.950
68	0.996	0.907	0.825	0.863
67	0.905	0.824	0.750	0.784
66	0.824	0.750	0.700	0.714
65	0.750	0.700	0.650	0.650
64	0.700	0.650	0.600	0.607
63	0.650	0.600	0.550	0.563
62	0.600	0.550	0.500	0.520
61	0.550	0.500	0.475	0.477
60	0.500	0.475	0.450	0.433
59	0.475	0.450	0.425	0.412
58	0.450	0.425	0.400	0.390
57	0.425	0.400	0.375	0.368
56	0.400	0.375	0.344	0.347
55	0.375	0.344	0.316	0.325

<b>FICA Taxable Wage Base</b>	
<u>Year</u>	<u>Limit</u>
1992	55,500
1993	57,600
1994	60,600
1995	61,200
1996	62,700
1997	65,400
1998	68,400
1999	72,600
2000	76,200
2001	80,400

<b>Key Employee Compensation IRC section 416</b>		
<u>Year</u>	<u>2000</u>	<u>2001</u>
Officer	67,500	70,000
10 largest owners	30,000	35,000
1% owner	150,000	150,000

**LIMITS, TABLES AND FORMULAS**  
(To be included with the EA-2 (Segment B) examination)

**FACTORS USED TO REDUCE MAXIMUM PBGC GUARANTEED BENEFITS  
FOR PAYMENTS OTHER THAN AS A SINGLE LIFE ANNUITY AT AGE 65**

<b>Commencement Age</b>	
<u>Age</u>	<u>Factor</u>
65 & over	1.00
64	.93
63	.86
62	.79
61	.72
60	.65
59	.61
58	.57
57	.53
56	.49
55	.45
54	.43
53	.41
52	.39
51	.37
50	.35
49	.33
48	.31
47	.29
46	.27
45	.25

<b>Form of Payment Joint &amp; Contingent</b>		
		with 10 yr
<u>Percent</u>	<u>Factor</u>	<u>Certain</u>
50%	.900	× .960
66 2/3 %	.867	× .970
75%	.850	× .975
100%	.800	× .990

<b>Form of Payment Joint &amp; Survivor</b>	
<u>Percent</u>	<u>Factor</u>
50%	1.00
66 2/3 %	.93
75%	.90
100%	.80

<b>Age Difference For J&amp;S Beneficiary</b>		
<u>Difference</u>	<u>Younger</u>	<u>Older</u>
1	.99	1.005
2	.98	1.010
3	.97	1.015
4	.96	1.020
5	.95	1.025
6	.94	1.030
7	.93	1.035
8	.92	1.040
9	.91	1.045
10	.90	1.050

<b>Form of Payment Certain &amp; Life*</b>	
<u>Years</u>	<u>Factor</u>
1	.995
2	.990
3	.985
4	.980
5	.975
6	.965
7	.955
8	.945
9	.935
10	.925

\*Reduction decreases by  
0.01 per year in excess of 10.

**LIMITS, TABLES AND FORMULAS**  
**(To be included with the EA-2 (Segment B) examination)**

**PBGC ADJUSTMENTS TO VESTED BENEFITS TO DETERMINE VARIABLE PREMIUM**

$$VB_{adj} = VB_{Pay} \times 0.94^{(RIR-BIR)} + \left[ VB_{Nonpay} \times 0.94^{(RIR-BIR)} \times ((100 + BIR) / (100 + RIR))^{(ARA-50)} \right]$$

ARA = Assumed retirement age

RIR = Required interest rate

BIR = Current Liability interest rate

$VB_{adj}$  = Adjusted vested benefits

$VB_{pay}$  = Retiree vested benefits

$VB_{nonpay}$  = All other vested benefits

## **PENSION EA-2 (SEGMENT A) EXAMINATION**

**NOVEMBER 2001**

The EA-2, Segment A examination is four hours in length and covers the selection of actuarial assumptions and calculation of minimum required and maximum tax-deductible contributions under current pension law, along with the related actuarial mathematics. Segment A of the EA-2 examination presupposes knowledge of the topics covered in the EA-1 examination.

### **Syllabus**

Actuarial cost methods, including unit credit, projected unit credit, entry age normal, individual level premium, aggregate, individual aggregate, attained age normal, frozen initial liability, shortfall, one-year term, and variations thereof.

Selection of actuarial assumptions.

Determination of experience gains and losses and analysis by source.

Effect on valuation results of various patterns of experience, including experience with respect to investment earnings changes in asset value, mortality, disability, employee turnover, changes in compensation, retirement, choice or retirement options, and Social Security.

Effect on valuation results of changes in plan provisions, actuarial cost methods, asset valuation methods, and actuarial assumptions.

Valuation of ancillary benefits.

Valuation techniques for handling employee contributions and split-funded arrangements.

Minimum funding requirements including, but not limited to:

- The basics of the funding standard account including amortization periods, where applicable, and the credit balance

- The full funding limitation

- Required quarterly contributions and liquidity shortfall

- The additional funding charge and accumulated reconciliation account

- Waivers of funding deficiencies, and the alternative minimum funding standard account

- The effect of spin-offs and mergers on the funding standard account

- Special funding requirements for multiemployer plans

Maximum deductible contributions for federal income tax purposes including the treatment of contribution carryovers and contributions for a plan year which are deducted for the prior taxable year.

Penalty taxes for failures to meet minimum funding standards and for contributions in excess of tax-deductible limits.

Valuation of plan assets

### **Suggested Readings**

The Advisory Committee on Actuarial Examinations believes that most (if not all) of the topics in the syllabus are covered in one or more of the following sources. The references listed below are to identify available resources from which the candidate may select. This list is not meant to describe or modify the syllabus listed above. New or revised sources, if any, are asterisked. Pension law and IRS promulgations can be found in publications of Warren, Gorham & Lamont, Commerce Clearing House, Maxwell Macmillan, Research Institute of America, and similar organizations.

Aitken, W.H., Pension Funding and Valuation, (2<sup>nd</sup> Edition – 1996);  
Actex Publications, P.O. Box 974, Winsted, CT 06098

Anderson, A.W., Pension Mathematics for Actuaries, (2<sup>nd</sup> Edition – 1990);  
Actex Publications, P.O. Box 974, Winsted, CT 06098

Berin, B. N., The Fundamentals of Pension Mathematics, (1989);  
Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226

Farrimond, W., Mayer, D., Farber, D., and Matray, G., Actuarial Cost Methods, A Review (1998);  
ASPA Book Order Department, Department 417, P.O. Box 753, Waldorf, MD 02604

Actuarial Standard of Practice No. 4, “Measuring Pension Obligations”

Actuarial Standard of Practice No. 27, “Selection of Economic Assumptions for Measuring Pension Obligations”

Actuarial Standard of Practice No. 35, “Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations”

Employee Retirement Income Security Act of 1974 (ERISA) section 302, as amended through June 30, 2001.

2000 Schedule B of Form 5500, including instructions.

IRS Promulgations:

#### Internal Revenue Code Sections, as amended through June 30, 2001:

404	Deductible Employer Contributions to a Deferred-Payment Plan
412	Minimum Funding Standards
413	Collectively Bargained Plans, etc.
414 Subsection (I) only	Definitions and Special Rules – Merger and Consolidations of Plans or Transfers of Plan Assets
4971	Taxes on Failure to Meet Minimum Funding Standards
4972	Tax on Nondeductible Contributions to Qualified Employer Plans
6059	Periodic Report of Actuary

Regulations:

1.404(a)-14	Special Rules in connection with ERISA – Deductible Limits
11.412(c)-12	Extension of time to make contributions
1.412(c)(1)-1	Determinations to be made under funding method
1.412(c)(1)-2	Shortfall method
1.412(c)(2)-1	Valuation of plan assets; reasonable actuarial methods
1.412(c)(3)-1	Reasonable funding methods
301.6059-1	Periodic report of actuary

Revenue Rulings:

77-2	Change in benefit structure after valuation date
78-48	Assumptions & methods specified in plan
78-331	Assumption that employees retire at normal retirement date
79-237	Terminating plan – funding standard account and penalty taxes
80-315	Supplementary benefits
81-13	Full funding limitation
81-136	Election to receive benefits less than plan provides
81-137	Separate funding account for separate plans
81-212	Funding standard account, with spin-off (see revenue ruling 86-47)
81-213	Experience gains & losses, amortizations
81-214	Interest charges in funding standard account
82-125	Full funding limitation and deductible limit
84-62	Deductible limit under 404(a)(1)(A)
86-47	(Sequel to revenue ruling 81-212)
95-28	(Unisex) mortality table, additional funding charge
95-31	Quarterly contributions and liquidity
96-7	Disability table, additional funding charge
96-20	Amortization bases in determining additional funding charge
96-21	Transition rule under 412(l)(11)
2000-20	Minimum funding standards – funding standard account – amortization bases

Notices:

87-37	Excise Tax on non-deductible contributions
89-52	Quarterly contributions
90-11	Interest rates for calculating current liability

Revenue Procedures:

90-49	Recovery of excess contributions
2000-40	Automatic Approval for Change of Funding Method
2000-41	Change in funding method

Announcements:

96-26	Announces rules for refund to avoid excise tax on non-deductible contributions
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### Society of Actuaries Study Notes

The Society of Actuaries has developed various study notes for the use of students preparing for its examinations on these subjects. These study notes are revised periodically, and new study notes may be added. The following study notes are available as of June 30, 2000:

Pension Funding Exercises, with Addendum

Variations on Entry Age Normal Cost Methods

Alternate Minimum Funding Standard

Excerpts on Plan Qualification

Intro to Pension Regulations

Individual study notes on IRC sections 404, 412, 413

Multiemployer Pension Plans Amendment Act of 1980

Mortality Tables for Pension Plans

Selection of Interest Assumptions for Pension Plan Valuation

Selection of Actuarial Assumptions

Commutation Functions

Penalty Taxes Under the U.S. Internal Revenue Code

All candidates for the Joint Board examinations should contact the SOA to order copies of study notes. It should be realized, however, that such material was not necessarily drawn up with the particular nature of the Joint Board examinations in mind.

### **Conditions Generally Applicable to All EA-2 (Segment A) Examination Questions**

If applicable, the following conditions should be considered a part of the data for each question, unless otherwise stated or implied:

#### **General Conditions Regarding Plan Provisions**

- (1) “Plan” or “pension plan” means a defined benefit pension plan.
- (2) The plan is qualified under Code section 401. Thus, for example, any benefit formulas should be understood to be limited by other plan provisions required by the Code.
- (3) The plan is sponsored by a single employer; the sponsoring employer is not a member of a controlled group.
- (4) The plan is not established or maintained in connection with a collectively bargained agreement.
- (5) The plan year, the employer's limitation year, and the employer's tax year are all the calendar year.
- (6) The normal retirement age is 65.
- (7) Retirement pensions commence at normal retirement age and are paid monthly for life at the beginning of each month.
- (8) The plan covers all active employees of the employer; there is no age or service requirement for participation. Thus, when referring to active employees, the terms “employee” and “participant” are synonymous.
- (9) There are no, and never have been, mandatory or voluntary employee contributions.
- (10) Service for purposes of vesting and benefit accrual is credited on the basis of time elapsed since date of hire.
- (11) When the normal retirement benefit is computed as a dollar amount, or as a percentage of compensation, for each year of service, the accrued benefit is defined likewise.
- (12) Actuarial equivalence is based on the mortality table and interest rate assumed for funding purposes.
- (13) Qualified joint and survivor annuities and qualified preretirement survivor annuities are provided in such manner that they result in no cost to the employer.
- (14) The plan has not been top-heavy in any year.
- (15) The plan has not been amended since its effective date.

### **General Conditions Regarding Funding**

- (16) Any actuarial valuation encompasses not only all active employees but also retired employees, beneficiaries, and former employees entitled to vested deferred pensions.
- (17) The valuation date is the first day of the plan year; i.e., participant data, present values, asset values, etc. are as of that date. Also, normal costs are payable annually, the first being due on the valuation date.
- (18) The actuarial cost method, or funding method, is “reasonable” within the meaning of Code section 412 and the regulations thereon. Thus, for example, the unit credit cost method should be used in accordance with the regulations under Code section 412.
- (19) Where the normal cost under an actuarial cost method may be computed as either a level percentage of compensation or a level dollar amount, the level percentage approach is used if the plan benefits are based on compensation, and the level dollar approach is used if they are not.
- (20) Under the frozen initial liability method, whenever there is a change in the plan, actuarial assumptions, or asset valuation method, the unfunded liability is adjusted by adding to it the increase (positive or negative) in the unfunded entry age normal accrued liability due to the change. Likewise, under the attained age normal method, the unfunded liability is adjusted by adding to it the increase in the unfunded unit credit accrued liability.
- (21) The terms “actuarial value of assets” and “market value of assets” mean the values developed for purposes of Code section 412, before being adjusted as required under funding methods of the aggregate type for items such as the existing credit balance or the outstanding balances of certain bases.
- (22) All actuarial assumptions are deemed “reasonable” and meet the “best estimate” criterion.
- (23) The actuarial cost method, asset valuation method, and actuarial assumptions have not been changed since the plan effective date.
- (24) The adoption date of any plan or amendment is the same as its effective date.
- (25) The term “minimum required contribution” means the smallest contribution for a plan year which will prevent a funding deficiency at the end of that plan year, without regard to the alternative minimum funding standard account. Amounts to be amortized are not combined or offset against one another.
- (26) Additional funding charges and additional interest charges due to late quarterly contributions have never applied and there is no liquidity shortfall.
- (27) No waivers of funding deficiencies or extensions of amortization periods have been granted.
- (28) The interest rate used for amortizing waivers and for extensions of amortization periods is the same as the valuation interest rate.
- (29) The employer is taxable, and all employer contributions for each prior plan year have been deducted by the employer for its tax year coincident with such plan year.

- (30) For purposes of determining the deductible limit for any year, the employer does not use (and has never used) the fresh-start alternative and does not combine (and has never combined) amortization bases.
- (31) The full funding limitation has never applied.
- (32) Expenses are paid directly by the employer, rather than from the assets of the plan, and therefore do not affect the funding of the plan.
- (33) Assumed compensation increases first apply to the year immediately following the latest year for which valuation compensation is shown.
- (34) The additional funding charge shall be disregarded if sufficient information to determine such charge is not provided.
- (35) For purposes of determining the additional funding charge, the optional rule and the transition rule shall be disregarded unless there is specific reference to such rules.
- (36) The quarterly contribution requirement and the liquidity shortfall shall be disregarded if sufficient information to determine such requirement is not provided.
- (37) The full funding limitations based on current liability shall be disregarded if sufficient information to determine such limitations is not provided.
- (38) For purposes of determining the deductible limit, the unfunded current liability shall be disregarded if sufficient information to determine such liability is not provided.
- (39) Unless separate current liabilities are provided, the current liability is the same for all purposes.

**Miscellaneous General Conditions**

- (40) All plan provisions and funding comply with all temporary and final regulations under the Internal Revenue Code and ERISA, as amended through June 30, 2001.
- (41) The employer has never maintained a defined contribution plan
- (42) References to law and regulation section numbers are for clarity and can be assumed to be correct.

If applicable, the preceding conditions should be considered a part of the data for each question, unless otherwise stated or implied.